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NEURONUS 2022
NEUROSCIENCE FORUM
SUPPORTED BY IBRO

15-17 OCTOBER 2022, KRAKOW, POLAND

NENCKI INSTITUTE OF EXPERIMENTAL BIOLOGY PAS WARSAW, POLAND

ACTA NEUROBIOLOGIAE EXPERIMENTALIS

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NEURONUS 2022 NEUROSCIENCE FORUM SUPPORTED BY IBRO

15–17 OCTOBER 2022, KRAKOW, POLAND

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PROGRAMME

14TH OCTOBER, 2022

INSTITUTE OF PSYCHOLOGY OF JAGIELLONIAN UNIVERSITY

Workshop I – Room 2.15

DeepLabCut by Jessy Lauer

*(Swiss Federal Institute of Technology, Lausanne, Switzerland & Harvard University, USA)***Workshop II – Room 2.12**Multimodal recordings: an insight into combining EEG with eye tracking and other research methods
*sponsored by Brain Products Academy and Elmiko Biosignals***15TH OCTOBER, 2022**

AUDITORIUM MAXIMUM, JAGIELLONIAN UNIVERSITY

9:00–10:10**Opening Ceremony – Large hall A**

Vice Rector for University Development, Jagiellonian University

prof. Jarosław Górniak

Vice-Dean for Science and International Relations, Faculty of Biology, Jagiellonian University

*prof. Magdalena Chadzińska***Keynote lecture – Large hall A**

Childhood physical activity effects on brain health and cognition

*Speaker: Charles Hillman (Department of Psychology, Department of Physical Therapy, Movement, and Rehabilitation Sciences, Northeastern University, USA)***10:10–10:45****Flashtalks – Large hall A****10:45–11:15****Coffee Break****11:15–13:15****Special Biological Session I – Large hall A**

Astrocytes

*Speakers: Alexei Verkhratsky, Mykhailo Batiuk, Dmitri Rusakov, Olena Bukalo***Cognitive Session I – Large hall B**

How does exercise benefit cognition and emotion?

*Speakers: Irene Estaban-Cornejo, Tomasz Ligęza, Dominika Pindus, Angelika Maurer***13:15–13:45****Lunch****13:45–15:00****Poster Session I – Exhibition room****15:00–16:00****Keynote lecture – Large hall A**

From a demand-based to a supply-limited view of brain energetics

Speaker: Suzanaerculano-Houzel (Department of Psychology and Biological Sciences, Vanderbilt University, USA)

- 16:00–17:30** **Biological Session II – Large hall A**
 Basic Neuroscience
Speakers: Aleksandra Pękowska, Katarzyna Ciuba, Michael Gabriel, Joanna Danielewicz
- Cognitive Session II – Large hall B**
 Emotional processing in modern neuroscience – from human-rat dyads to VR devices
Speakers: Magdalena Pietruch, Malwina Ankiewicz, Jan Argasiński, Anna Kaźmierowska, Ingrida Zelionkaite
- Medical Session I – Medium hall A**
 Biomarkers of Neurodegeneration
Speakers: Kaj Blennow, Fernando Gonzalez-Ortiz, Przemysław Kac, Patrycja Dżianok
- 17:30–18:00** **Coffee Break**
- 18:00–19:00** **Keynote lecture – Large hall A**
 The cinematic brain: Mapping the human emotion circuits with motion pictures
Speaker: Lauri Nummenmaa (Human Emotion Systems Laboratory at Turku PET Centre, Finland)
- 19:00–** **Welcome Reception**

16TH OCTOBER, 2022
 AUDITORIUM MAXIMUM, JAGIELLONIAN UNIVERSITY

- 7:00–8:00** **Run for your brain!**
*Parking lot in front of the Institute of Psychology of the Jagiellonian University,
 6 Ingardena Street*
 Neu-run-us
- 9:00–10:00** **Keynote lecture – Large hall A**
 Routes to enhance stress resilience: Manipulation of genes or environment?
Speaker: Mathias Schmidt (Max Planck Institute of Psychiatry, Munich, Germany)
- 10:00–11:30** **Biological Session III – Large hall A**
 Neural substrates of affective behavior
Speakers: Marcelina Olga Węzik, Natalia Roszkowska, Olga Gulka, Karolina Protokowicz, Patryk Sambak
- Cognitive Session III – Large hall B**
 Approaches to increase replicability in neuroscience – lessons learned from consortia,
 many analysts and cooperative data collection
Speakers: Sven Mueller, Katharina Paul, Elena Cesnaite, Vanja Kovic
- Biological Session IV – Medium hall A**
 Markers of Aging
Speakers: Urszula Wojda, Natalia Pudelko-Malik, Anna Mietelska-Porowska, Gregory Petrazzo
- 11:30–12:00** **Coffee Break**

- 12:00–13:30** **Biological Session V – Large hall A**
Advanced neurotechnologies for brain activity monitoring and modulation
Speakers: Zoltan Fekete, Csaba Horváth, Zsófia Lantos, Kirti Sharma
- Cognitive Session IV – Large hall B**
Plastic brain and language – adaptive changes of neural networks
Speakers: Aleksandra Herman, Marta Wójcik, Agata Wolna, Jonas Walther, Anna Stróż
- Medical Session II – Medium hall A**
Translational Neuropsychiatry
Speakers: Ali Jawaid, Weronika Tomaszewska, Kinga Farkas, Katarzyna Hryniewiecka, Suelen Baggio, Sabina Podlewska
- 13:30–14:00** **Lunch**
- 14:00–15:15** **Poster Session II – Exhibition hall**
- 15:15–17:00** **Biological Session VI – Large hall A**
Systems Neuroscience of Sensory Processing
Speakers: Flavio Donato, Bartosz Zglinicki, Magdalena Sabat, Maciej Kania, Marek Brodzki
- Cognitive Session V – Large hall B**
Neuroimaging of the reading brain
Speakers: Milene Bonte, Katarzyna Chyl, Agnieszka Dębska, Agnieszka Glica, Katarzyna Wasilewska
- Computational Session I – Medium hall A**
New methods in MRI
Speakers: Rita Nunes, Michał Rafał Zaręba, Dominika Ciupek, Marcin Sińczuk, Alaa Alghanimy
- 17:00–17:30** **Coffee Break**
- 17:30–18:30** **Keynote lecture – Large hall A**
Fish feelings: Motivational internal states in larval zebrafish
Speaker: Florian Engert (Department of Molecular and Cellular Biology, Center for Brain Science, Harvard University, USA)
- 20:30–** **Neuronus Party**

17TH OCTOBER, 2022
AUDITORIUM MAXIMUM, JAGIELLONIAN UNIVERSITY

- 9:00–10:00** **Keynote lecture – Large hall A**
Diversity of oxytocin circuits modulating distinct socio-emotional behaviors
Speaker: Valery Grinevich (Central Institute of Mental Health, University of Heidelberg, Germany)

- 10:00–11:30** **Biological Session VII – Large hall A**
Hypothalamic control of behavior
Speakers: Frank Meye, Karolina Hajdukiewicz, Emilia Gawron, Alan Kania
- Cognitive Session VI – Large hall B**
Search for neural biomarkers of aware consciousness
Speakers: Ilona Kotlewska, Lucja Doradzińska, Karolina Golec, Julia Papiernik, Klaudia Krystecka
- Medical Session III – Medium hall A**
Novel targets in retinal ganglion cell neuroprotection
Speakers: Marialaura Amadio, Piotr Rodak, Joanna Machowicz, Anna Pacwa
- 11:30–12:00** **Coffee Break**
- 12:00–13:30** **Biological Session VIII – Large hall A**
Mitochondrial dysfunctions in neurological disorders
Speakers: Alessandro Prigione, Sinéad A. O’Sullivan, Aleksandra Stawikowska, Carla Ramon
- Cognitive Session VII – Large hall B**
Pupillometry: Getting information in the glimpse of an eye
Speakers: Alexandre Zénon, Beaupoil Laurent, Bartłomiej Król-Józaga, Monika Riegel, Jakub Cacek
- 13:30–14:00** **Lunch**
- 14:00–15:15** **Poster Session III – Exhibition hall**
- 15:15–16:30** **Biological Session IX – Large hall A**
Blood-brain barrier
Speakers: Aleksandra Rutkowska, Fionä Caratis, Jakub Jurczyk, Ewelina Czuba
- Cognitive Session VIII – Large hall B**
Specificity of language network in the contingently blind brain
Speakers: Maksymilian Korczyk, Marta Urbaniak, Dominika Radziun, Łukasz Bola, Jacek Matuszewski
- Computational Session II – Medium hall A**
Novel methods in EEG
Speakers: Joanna Duda-Golawska, Piotr Biegański, Anna Grabowska, Nikodem Hryniewicz, Sandra Frycz
- 16:30–17:00** **Coffee Break**
- 17:00–18:00** **Keynote lecture – Large hall A**
Built to learn: Insights into nature and nurture from studies with people born blind and cultural expertise
Speaker: Marina Bedny (Department of Psychological and Brain Sciences, Johns Hopkins University, USA)
- 18:00–18:15** **Awards & Closing Ceremony – Large hall A**

to study cellular bioenergetics by monitoring oxygen consumption rate and extracellular acidification rate. The obtained results showed a significant beneficial effect of 25nM AP39 on viability of HT-22 subjected to OGD in both MTT and LDH tests and on the mitochondrial membrane potential. Tested compound modulated also cellular bioenergetics. To conclude, AP39 may have neuroprotective effect on cells under ischemic conditions and the mechanism of its action might be associated with modulation of oxidative phosphorylation in mitochondria.

Funding: POB qLIFE (U1C/P04/NO/02.15).

PHARMACOLOGICAL INHIBITION OF MMP-9 ENZYME ACTIVITY IMPROVES ANIMAL RECOVERY AFTER ISCHEMIC STROKE

Agnieszka Kostrzewska-Księżyk^{1*}, Barbara Pijet¹, Maja Pijet-Kucicka¹, Leszek Kaczmarek¹, Magdalena Kania², Anna Krause²

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Matrix metalloproteinase-9 (MMP-9) levels are markedly induced after cerebral ischemia. Furthermore, this extracellularly operating protease has been implicated in post-stroke functional recovery. In the present study to evaluate the effects of MMP-9 inhibition on post-stroke recovery, we used PKL-021, a potent inhibitor of MMP-9 and a drug candidate currently under development by Pikralida. For cerebral ischemia we followed focal middle cerebral artery occlusion (fMCAo) protocol in mice. We used animals with genetically modified MMP-9 levels and C57BL6/J mice for control. Mice received 3 doses of PKL-021 during the first 24 h after ischemia. Drug pharmacokinetics was analyzed using mass spectrometry. The minimum effective dose of the drug and inhibitory effect of PKL-021 was determined using Western Blot-base evaluation of MMP-9 dependent cleavage of Nectin-3, its neuronal substrate. We have found shown that PKL-021 administered after ischemic stroke improves animal condition and reduces neurological deficits in wild-type animals as well in MMP-9 overexpressing animals. We have also observed that the drug crosses the blood-brain barrier and is present in the brain after intraperitoneal administration. Notably, PKL-021 inhibited MMP-9-dependent nectin-3 cleavage *in vitro* and *in vivo*. The current study supports the use of PKL-021 as a beneficial component of the post-stroke recovery process.

Funding: NCBiR.

SURFACE MODIFICATION OF TiO₂ NANOPARTICLES MODERATES NEUROLOGICAL IMPAIRMENTS AND UPREGULATED OXIDATIVE STRESS INDICATOR IN EYES OF ADULT WISTAR RATS

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Titanium dioxide nanoparticles (TiO₂ NPs) are widely used in many daily necessities, including medicine, food/beverages, and cosmetics. Besides the numerous benefits of TiO₂ NPs utilization, their use raises public concerns since humans are exposed to their toxicity. As different alterations could moderate the observed side effects of commercially available bare TiO₂ NPs, we investigated whether TiO₂/SA NPs (TiO₂ NPs surface-modified with salicylic acid (SA)) impact the bare TiO₂ NPs-induced sensory-motor impairments and eye level of 4-hydroxynonenal (HNE) as the final product of lipid peroxidation and indicator of oxidative stress. Our results demonstrate that 14 days following single oral treatment both investigated TiO₂ NPs in adult Wistar rats affected neurological functions and promoted oxidative stress to different extents. Namely, the SA modification alleviated TiO₂ NPs-induced asymmetry in four limb movement, while the hind limb clasp reflex and spontaneous activity scores were similar between TiO₂ groups. In the eye crude membrane fraction of TiO₂/SA NPs-treated rats in comparison to animals treated with bare TiO₂ NPs, the HNE level was downregulated. Although SA exhibits the ability to reduce some TiO₂ NPs toxicity, due to still unknown mechanism of TiO₂ and TiO₂/SA NPs actions, further studies are required to verify herein presented findings.

Funding: Financially supported by Ministry of Education, Science and Technological Development of the Republic of Serbia, grant 451-03-68/2022-14/200017.

THE LEVEL OF ACTIVATION OF THE RAT BRAIN NITRERGIC SYSTEM IN RESPONSE TO INDUCED SEIZURES AND THE RELATIONSHIP BETWEEN THE LEVEL OF NO AND THE INTENSITY OF SEIZURE BEHAVIORS

Szymon Kantor¹, Agnieszka Drzał², Martyna Elas², Krzysztof Janeczko¹

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